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In re Patent Application of
RAYNOR
Serial No. 10/786,878
Filed: **FEBRUARY 25, 2004**

REMARKS

Applicant thanks the Examiner for the thorough examination of the present application and for withdrawing the previous rejections. Applicant has amended independent Claim 11 to incorporate the subject matter of dependent Claim 16, now canceled. Independent Claim 20 has been amended to incorporate the subject matter of dependent Claim 23, now canceled. New independent Claim 37 incorporates the subject matter of previous Claims 11 and 18, and dependent Claim 18 has been canceled. Dependent Claims 38 to 42 are also added.

In view of the arguments and amendments presented herein, it is respectfully submitted that all pending claims are patentable.

I. The Claimed Invention

Amended independent Claim 11 is directed to an image sensing structure including a photodiode comprising a layer comprising a first conductivity type epitaxial layer and having an upper surface, and a well of a second conductivity type having opposing sides and positioned in the layer. The well defines a collection node. The photodiode further comprises an isolation trench at least partially bounding an upper portion of the well at the opposing sides thereof and comprising a shallow trench isolation (STI) having a depth from the upper surface of the layer less than the depth of the well. The epitaxial layer provides increased sensitivity of the photodiode, as disclosed in the present application. (Specification of present application, ¶ 25).

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Amended independent Claim 20 is directed to a CMOS image sensing structure similar to independent Claim 11.

New independent Claim 37 is directed to an image sensing structure similar to independent Claim 11, without the epitaxial recitation, and further recites an n-p junction formed at an interface between the STI and the well, and an STI width substantially extending over the width of the pixel.

II. Claims 11, 12, 14-15, 17, 19-21, 24-26, and 36 Are Patentable

Prior dependent Claims 16 and 23 were rejected by the Examiner over U.S. Patent No. 6,569,700 to Yang in view of U.S. Patent No. 6,723,594 to Rhodes. The Yang patent discloses a photodiode with a layer of a first conductivity type positioned between an oxide-rich silicon layer 56, a depletion region 54, and a doped region 52. (Figure 2). The Examiner cited the Rhodes patent as disclosing an epitaxial layer having a P-well formed in layer and correctly noted that the Yang patent does not disclose an epitaxial layer.

Applicant respectfully submits that the Examiner is impermissibly using the teachings of Applicant's own patent application as a roadmap to modify the prior art. Although the Yang patent discloses a substrate and layers thereon, (Col. 2, lines 51-65), the Yang patent makes no reference to an epitaxial layer. Further, the Yang patent teaches away from the recited epitaxial layer by disclosing polycrystalline layers. (Col. 2, line 51 : col. 3, line 23). An epitaxial layer is by its nature monocrystalline.

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There is simply no teaching or suggestion in the cited references to provide the combination of features as claimed. Accordingly, for at least the reasons given above, Applicant maintains that the cited references do not disclose or fairly suggest the invention as set forth in amended independent Claims 11 and 20. Furthermore, no proper modification of the teachings of these references could result in the invention as claimed. Thus, the rejection under 35 U.S.C. § 103(a) should be withdrawn.

Accordingly, amended independent Claims 11 and 20 are patentable. Their respective dependent claims, which recite yet further distinguishing features, are also patentable, and require no further discussion herein.

III. Claims 37-42 Are Patentable

New independent Claim 37 recites an "STI having a depth from the upper surface of said layer less than the depth of said well and having a width substantially extending over the width of the pixel". This is supported by the originally filed application in paragraph 27.

The Yang patent discloses an STI 48 surrounding the pixel, (Col. 2, lines 44-50 and Figures 2-8), but does not disclose a STI extending over the width of the pixel. The Rhodes patent also discloses an STI 112 surrounding the pixel. (Col. 8, lines 43-57 and Figures 5, 7-11). None of the other prior art references supplies the noted deficiencies of the Yang patent and the Rhodes patent.

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Accordingly, new independent Claim 37 is patentable. Its respective dependent claims, which recite yet further distinguishing features, are also patentable, and require no further discussion herein.

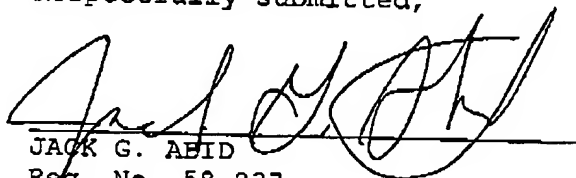
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IV. Conclusion

In view of the arguments and amendments provided herein, it is submitted that all the claims are patentable. Accordingly, a Notice of Allowance is requested in due course. Should any minor informalities need to be addressed, the Examiner is encouraged to contact the undersigned patent agent at the telephone number listed below.

Respectfully submitted,


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CERTIFICATE OF FACSIMILE TRANSMISSION

I HEREBY CERTIFY that the foregoing correspondence has been forwarded via facsimile number 571-273-8300 to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 this 12th day of September, 2006.

